

DESCRIPTIONS AND RECORDS OF NEARCTIC
MECOPTERA

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During the past year so many unusual and interesting Nearctic Mecoptera have come under my observation that it seemed justifiable to publish an account of them at this time, even though another summer will probably add to the list. The most remarkable collection which I have yet received for determination was sent by Professor O. L. Cartwright, of Clemson College, South Carolina. Included in this lot were the females of three species (*flexa*, *banksi*, and *acuta*) previously known only from males; a long series of specimens of a species (*flexa*) formerly known solely from the holotype; another long series of a second species (*banksi*), which, although described forty years ago, has been known only from 3 specimens; and 5 species not previously recorded from the state of South Carolina. Other specimens forming the basis of this paper have been received from Professor R. C. Smith and Professor H. B. Hungerford of Kansas, Professor H. E. Jaques, Iowa Wesleyan College, and Mr. Robert Goslin, Lancaster, Ohio. To these entomologists I owe many thanks for the opportunity of studying their material.

Family Panorpidæ

Panorpa flexa Carp.

Figure 3

Psyche, 1935, 42:108, fig. 2.

This species was described from a single male collected in the Smoky Mountains, N. Carolina. Among the Mecoptera sent by Professor Cartwright there are 3 males and 7 females from North and South Carolina, as follows:

SOUTH CAROLINA: 1 ♀, Rocky Bottom, Pickens Co., May 5, 1934 (O. L. Cartwright); 1 ♀, Rocky Bottom, May 31, 1933 (O. L. C.); 1 ♀, Rocky Bottom, June 1, 1933 (J. G. Watts); 1 ♂, Pinnacle Mt., June 19, 1934 (O. L. C.); Earls' Ford, Pickens Co., July 8, 1933 (O. L. C.). NORTH CAROLINA: 2 ♂, 1 ♀, Sunburst, June 30, 1935 (O. C. L.); 1 ♀, Sunburst, June 14, 1934 (O. L. C.).

The wing membrane of the holotype of *flexa* was colorless, but the wings in the additional specimens show a surprising variation in color, surpassed in *Panorpa* only by that in *P. canadensis*. In half of the specimens listed above the wing membrane is colorless, and the markings are much reduced; whereas in the rest of the specimens the membrane is yellow and the markings are strongly developed. The female is similar to the male in coloration and markings. The internal skeleton within the 9th abdominal segment is large and resembles that of *sigmoides*, but differs in the curvature of the projecting part of the axis. In the key to the females of *Panorpa* contained in my revision of the Nearctic Mecoptera (Bull. Mus. Comp. Zoöl., 72: p. 225, 1931), *flexa* will run to couplet 15, and can be distinguished from the other species included there only by the structure of the internal skeleton. The female from Sunburst, N. Carolina, June 14, 1934, is designated as the allotype and deposited in the Museum of Comparative Zoölogy.

Panorpa anomala Carp.

Bull. Mus. Comp. Zoöl., 1931, 72:245.

Since this species has previously been known only from the types collected in Leavenworth and Douglas Counties, Kansas, it is of unusual interest to have the species turn up in Arkansas (Washington Co., May 21, 1928). Several specimens of both sexes from that locality were sent to me by Professor R. C. Smith. This record indicates that the species probably also occurs in Missouri and Oklahoma, from both of which states I have seen almost no specimens of *Panorpa*.

Panorpa venosa Westwood.

Trans. Ent. Soc. London, 1846, 4:190.

Four specimens of this species collected in Jones and

Madison counties, Iowa (June 9, July 7, 1932), were sent to me by Professor H. E. Jaques. These are the first specimens which I have seen from that state, though Ebsen-Petersen recorded it many years ago from there.

Panorpa banksi Hine

Figure 2

Trans. Ent. Soc. Amer., 1895, 72:315 (*affinis* Banks, nec Leach).

This rare species has previously been known only by the male type, which was collected in New York State, and two males from Pickens County, S. Carolina, recorded in my revision (1931). In the material recently sent by Professor Cartwright, there are 7 males and 1 female, all from Rocky Bottom, Pickens Co., S. Carolina: 4 ♂, 1 ♀, May 22, 1934; 1 ♂, June 21, 1933; 1 ♂, May 31, 1933; all collected by O. L. Cartwright and J. G. Watts. These new specimens are most interesting because all have the first marginal spot on the fore wings. This was a characteristic that I was unable to discern definitely in the type, which is a badly damaged specimen. Strangely enough, the two additional specimens which I saw from South Carolina in 1931 lacked the first marginal spot. The new material indicates that the absence of this spot is not a constant specific characteristic in *banksi*, although in all other Nearctic species of *Panorpa* so far known the presence or absence of the marginal spots is perfectly constant in at least 99% of the specimens.

The female of *banksi*, which is now known for the first time, is like the male in coloring. The internal skeleton of the 9th abdominal segment is large, but is unusual in possessing a very short axis, which does not project beyond the plate. The female collected at Rocky Bottom, Pickens Co., May 22, 1934, is here designated as the allotype and is deposited in the Museum of Comparative Zoölogy. In my key to the females of *Panorpa* (1931, p. 225), this specimen runs to couplet 18, where it is readily separated from *rufescens* and *interrupta* by the structure of the internal skeleton; but females lacking the first marginal spot, should any

turn up, will run to couplet 15, where the internal skeleton will again provide easy recognition.

Panorpa submaculosa Carp.

Bull. Mus. Comp. Zoöl., 1931, 72:255.

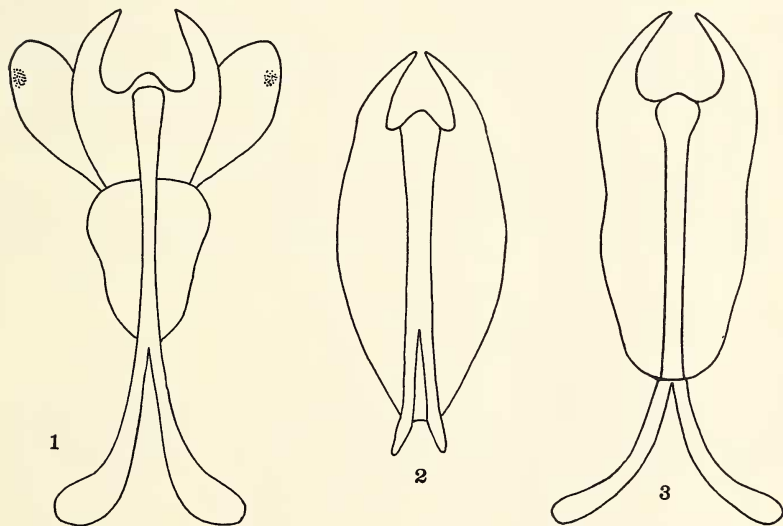
Eleven specimens of this species were included in the collection sent by Professor Cartwright, ten from S. Carolina (Pickens Co., May 31, 1933), and one specimen from Georgia (Raburn Bald Mt., Raburn Co., June 13, 1933). These are the first records of *submaculosa* in either state, and they greatly extend the range of the species, which has previously been known only from Michigan, New York, Ohio and Maryland.

Panorpa acuta Carp.

Figure 1

Bull. Mus. Comp. Zoöl., 1931, 72:253.

Nine specimens of *acuta* taken in S. Carolina (Pickens Co., May 31, June 21, August 25), and 3 in Georgia (Raburn Bald Mt., Raburn County, June 13) were sent by Professor Cartwright. These constitute the first record of the species



Figs. 1-3. 1. Internal skeleton of 9th sternite of *Panorpa acuta* Carp. (allotype). 2. Same of *Panorpa banksi* Hine (allotype). 3. Same of *Panorpa flexa* Carp. (allotype).

in those states. Three of these specimens being females we are able to determine satisfactorily the structure of the internal skeleton. In all other localities at which *acuta* has been collected, very similar species (such as *maculosa* and *nebulosa*) have also occurred, and in view of the relative scarcity of specimens of *acuta*, it has not been possible previously to identify the female of that species. As I pointed out in 1933, although I had seen 75 males from scattered localities, I was not certain of the female. But the three females sent by Professor Cartwright were taken with the males of *acuta*, and no other species resembling *acuta* was secured at that locality. An examination of the ninth sternite of the female and of the internal skeleton shows several points of difference from those structures in *nebulosa*. It is now clear that several of the females of the *nebulosa* group which I have previously seen were *acuta*, though it was not possible to correlate the sexes. This has now been done. The internal skeleton is close to that of *nebulosa*, but the axis projects further beyond the plate, which is also distinctly shorter. Furthermore, there is a supplementary plate which adheres to the inner surface of the 9th sternite, and which bears two black spots; these spots can be seen faintly through the sternite itself, when the insect is examined under a bright light. This supplementary plate is like that of *latipennis*, but in the latter it is situated further posteriorly. *Latipennis* and *acuta* are the only known species which possess this supplementary plate.

The female collected at Rocky Bottom, Pickens Co., S. Carolina (June 21, 1932), is here designated as the allotype and is deposited in the Museum of Comparative Zoölogy.

Family Bittacidæ

Bittacus strigosus Hagen

Synop. Neur. N. Amer., 1861, p. 246.

One male of this species, contained in Professor Cartwright's collection, is the first record from South Carolina (Clemson College, June 27, 1931).

Bittacus stigmaterus Say

West. Quart. Rep., 1823, 2:164.

One male, collected at Clemson College, S. Carolina (July

8, 1932) by O. L. Cartwright, is the first record for that state.

Bittacus occidentis Walker

Cat. Neur. Brit. Mus., 1853, p. 468.

Two specimens were collected at Clemson College, S. Carolina, September 14, 20, 1932, by O. L. Cartwright. This is the first record in the state.

Family Boreidæ

Although no new species of Nearctic Boreus have come to my attention during the past year, a great many specimens have been received, some belonging to species which have previously been little-known. Of particular interest is a long series of both sexes of *gracilis*, which was described only from two females. The new females show that the type specimens of this species were slightly damaged to the extent that the long hairs covering the body had been rubbed off, producing the effect of a short pubescence. Since the nature of the pubescence was one of the characteristics which I made use of in my previous key to the females of Boreus (Psyche, 42:112, 1935), undamaged specimens of *gracilis* will not run to that species. In this connection, also, I wish to correct certain errors which were introduced into the above mentioned key. In some way the statements in couplet 7 were confused with those of couplet 6, and the changes escaped my notice in the proof. The descriptions of the species concerned are of course correct, but for the sake of clarity and to correct the position of *gracilis*, I include here another key to the females of the Nearctic species of Boreus.¹

Key to the Females of Boreus

1. Fore wing reduced to a minute scar, similar to that of the hind wing.....*reductus* Carp.
Fore wing in the form of a small oval pad.....2.
2. Wings and body the same color (brown or black)3.
Wings much lighter (yellow or yellow-brown) than body (dark brown or black)7.

¹A typographical error in the key to the males of Boreus (ibid. p. 111) is also misleading: in the second line of couplet 1, the number should be "9" not "8."

3. Ovipositor short, only as long as rostrum.....4.
Ovipositor distinctly longer than the rostrum.....5.
4. Body either black or very dark brown.....*brumalis* Fitch.
Body light brown or medium brown.....*nivoriundus* Fitch.
5. Body covered with fine, white pubescence.....*unicolor* Hine.
Body covered with long, white or yellowish hairs.....6.
6. Wing pads somewhat brownish proximally; body above
dull or with a very slight shine.....*gracilis* Carp.
Wing pads entirely jet black; body above very shiny.....
nix Carp.
7. Ovipositor scarcely longer than the rostrum.....
intermedius Lloyd.
Ovipositor one and one-half times as long as rostrum....8.
8. Body light brown or reddish brown.....*californicus* var.
californicus Packard.
Body black or nearly so.....9.
9. Body black, but with a pronounced bronze hue, abdomen
above exceedingly shiny.....*borealis* Banks.
Body jet black; abdomen above with only a slight shine
californicus var. *fuscus* Carp.

Boreus brumalis Fitch

Amer. Journ. Agric., 5:278, 1847.

The first Ohio record of this species was secured in 1933. Since that time Mr. Robert Goslin, one of the first to find the insect in that state, has been on the alert for additional material, and as a result has collected an astonishingly large number of specimens from Hocking and Fairfield Counties. In December (1935) he secured about 225 specimens, in January about the same number, and in February over 326 specimens, making a total of more than 775 individuals! In one day alone (Feb. 3) Mr. Goslin collected 159 specimens. The notes which Mr. Goslin made concerning his captures are particularly interesting in showing the activity of these insects in different temperatures. Many of the specimens were found actively walking about during early December before any snow had fallen; most of these were collected on moss. The majority of the specimens, however, were taken on snow on days when the temperature was not far from 32° F. On December 31, following a tempera-

ture of -12° F. the night before, only 3 specimens (all females) were found on the snow and one of these was dead. But apparently falling snow or rain does not interfere with the activities of these insects; on December 23, 1935, Mr. Goslin collected 19 specimens during the course of a light snow fall, and again on January 9th he secured 7 specimens during a light rain.

Several hundred living specimens of *brumalis* were sent to me by Mr. Goslin, at my request, in the hope that it would prove not too difficult to rear them. The insects lived for several weeks, some for more than a month, and a great many eggs were secured; but the eggs failed to hatch. The antics of the male in bringing about copulation are most amusing. After approaching to within about half an inch of a female, he suddenly leaps in the air and onto the back of the female, turning himself over in the process of the jump so that he alights on his own back. Even during the process of landing he grasps her with his hook-like wings around the thorax or abdomen, and then seizes the end of her abdomen with his genital forceps. By a sudden twist he upsets the balance of the female, struggles to his feet, and runs around actively with the female held upside-down on his own back. I do not believe that copulation actually begins until the male has righted himself. It usually continues for several hours, and I have observed some pairs remain *in coitu* for as much as 12 hours.

Boreus nivoriundus Fitch

Amer. Journ. Agric., 5:277, 1847.

Twenty-five specimens of this species were also collected by Mr. Goslin during December, January and February. As in other parts of its range, *nivoriundus* is not nearly so abundant as *brumalis*. Several living specimens were sent to me by Mr. Goslin, and their behavior during courtship and mating was similar to that of the preceding species.

Boreus intermedius Lloyd

Pan. Pacific Ent., 10:119-120, 1934.

Three additional specimens (1 ♂, 2 ♀) of this little-known species have been sent to me by Mr. Lloyd; they were collected at McCarthy, Alaska, April 29, 1935.

Boreus gracilis Carp.

Psyche, 42:118; 1935.

A series of ten specimens (3 ♂, 7 ♀) of this insect were sent to me by Mr. Lloyd. 1 ♀ was collected at Kennecott, Alaska, April 15, 1935; and the rest at McCarthy, Alaska, April 29, 1935. This series is particularly interesting because the species has previously been known only from the two female types, and it now turns out that the type specimens were slightly damaged. The male is 3 mm. long; uniformly black except for the eyes (which are either black or dark brown) and the wings, which are sometimes brownish; the body including the wings but not the pronotum is covered with rather long white pilosity resembling that of *B. nix*, but not quite so prominent; pronotum with two rows of very long black hairs; wings with the outer margin almost straight as in *B. elegans* Carp. (see Psyche, 42, fig. 8, p. 121); hypandrium deeply emarginate, as in *B. nix* Carp. (Psyche, 42, fig. 7, p. 121); rostrum one and one-half times as long as the eye. One of the specimens taken at McCarthy, Alaska, April 29, 1935, is designated as the allotype and deposited in the Museum of Comparative Zoölogy.

The female is correctly described in my original account of the species, except that the body is covered with the long pilosity mentioned in the male; apparently the two type specimens were so badly rubbed that only the bases of the hairs remained, giving the appearance of a fine pubescence. The size of the wing pads seems to vary slightly but in the specimens so far collected the pads are shorter than in the other Nearctic species of *Boreus*, except of course *reductus* Carp.

This insect resembles *B. nix* Carp., from Montana, but is readily separated by the nearly straight outer margins of the wings in the male. *Gracilis* is the first Alaskan species found which possesses an emarginate hypandrium.